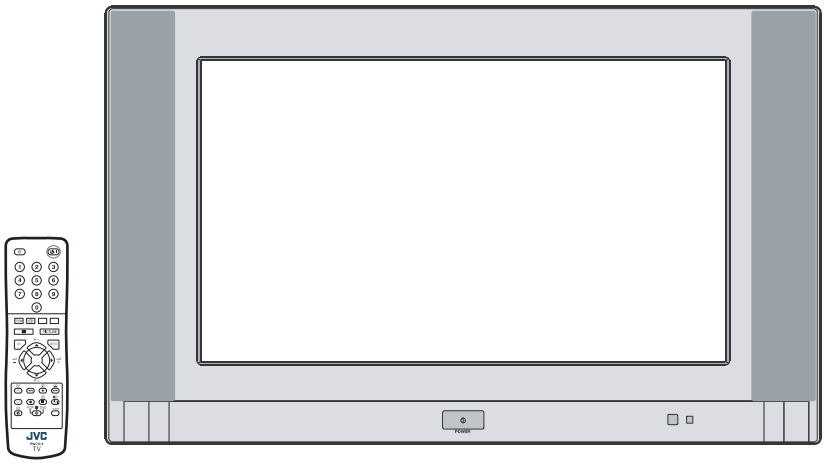
JVC

SERVICE MANUAL

FLAT COLOUR TELEVISION

AV-28F3SJ



InteriArt

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No.YA225
2005/2

SPECIFICATION

Item		Content
Dimensions (W × H × D)		80.5cm × 49.5cm × 48.6cm
Mass		41.0kg
TV RF System		CCIR (I)
Colour System	TV Mode	PAL
	Video Mode	PAL / NTSC 3.58 / NTSC 4.43
Sound System		A2 / NICAM
Teletext System		FLOF (Fastext) / TOP / WST
Receiving Frequency	VHF CATV	46.25MHz - 863.25MHz S01 - S41
Intermediate Frequency	VIF SIF	38.9MHz (I) 32.9MHz (6.0MHz)
Colour Sub Carrier Frequency		PAL (4.43MHz), NTSC (3.58MHz / 4.43MHz)
Power Input		AC220V - AC240V, 50Hz
Power Consumption		145W (Max)
Aerial Input Terminal		75Ω unbalanced, coaxial
Picture Tube Size		Visible size : 66cm (Measured diagonally) (H: 58.3cm × V: 33.0cm) 16:9 wide aspect
High Voltage		29kV (at zero bean current)
Speaker		Main: 6.0cm × 16cm, Oval type × 2 / Tweeter: 8Ω, 15W) × 2
Audio Output		10W + 10W (THD 10%)
EXT-1 Input / Output		21-pin Euro connector (SCART socket) × 1
EXT-2 Input / Output		21-pin Euro connector (SCART socket) × 1
EXT-3 Input / Output		21-pin Euro connector (SCART socket) × 1
EXT-4 Input	Video Audio (L/R)	1V(p-p) 75Ω, RCA pin jack × 1 500mV(rms) (-4dBs), High Impedance, RCA pin jack × 2
Headphone jack		Stereo mini jack 3.5mm × 1
Remote Control Unit		VE-30021286 (RM-C1512S), (AA/R06 dry battery × 2)

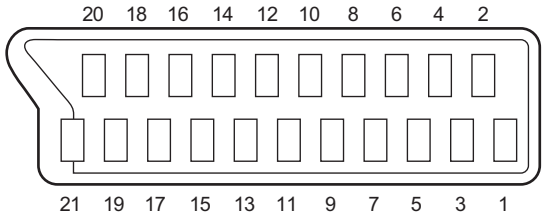
Design & specifications are subject to change without notice.

21-PIN EURO CONNECTOR (SCART) : EXT-1 / EXT-2 / EXT-3

Pin No.	Signal designation	Matching value	EXT-1	EXT-2	EXT-3
1	AUDIO R output	500mV(rms) (Nominal), Low impedance	Used (TV OUT)	Used (LINE OUT)	Not used
2	AUDIO R input	500mV(rms) (Nominal), High impedance	Used (R1)	Used (R2)	Used (R3)
3	AUDIO L output	500mV(rms) (Nominal), Low impedance	Used (TV OUT)	Used (LINE OUT)	Not used
4	AUDIO GND	---	Used	Used	Used
5	GND (B)	---	Used	Used	Used
6	AUDIO L input	500mV(rms) (Nominal), High impedance	Used (L1)	Used (L2)	Used (L3)
7	B input	$700mV_{(B-W)}$, 75 Ω	Used	Not used	Not used
8	FUNCTION SW (SLOW SW)	Low : 0V-3V High : 8V-12V, High impedance	Used	Used	Used
9	GND (G)	---	Used	Used	Used
10	SCL / T-V LINK	---	Not used	Used (SCL / T-V LINK)	Not used
11	G input	700mV(B-W), 75 Ω	Used	Not used	Not used
12	SDA3	---	Not used	Used	Not used
13	GND (R)	---	Used	Used	Used
14	GND (YS)	---	Used	Not used	Not used
15	R / C input	R : $700mV_{(B-W)}$, 75 Ω C : $300mV_{(P-P)}$, 75 Ω	Used (R)	Used (C2 / R)	Used (C3)
16	Ys input (FAST SW)	Low : 0V-0.4V, 75 Ω High : 1V-3V, 75 Ω	Used	Not used	Not used
17	GND (VIDEO output)	---	Used	Used	Used
18	GND (VIDEO input)	---	Used	Used	Used
19	VIDEO output	$1V_{(P-P)}$ (Negative sync),75 Ω	Used (TV OUT)	Used (LINE OUT)	Not used
20	VIDEO / Y input	$1V_{(P-P)}$ (Negative sync), 75 Ω	Used	Used	Used
21	COMMON GND	---	Used	Used	Used

(P-P= Peak to Peak, B-W= Blanking to white peak)

[Pin assignment]



SECTION 1
PRECAUTION

1.1 SAFETY PRECAUTIONS

(1) The design of this product contains special hardware and many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.

(2) Alterations of the design or circuitry of the product should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.

(3) Many electrical and mechanical parts in the product have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessary be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the Parts List of Service Manual. Electrical components having such features are identified by shading on the schematics and by (⚠) on the Parts List in the Service Manual. The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the Parts List of Service Manual may cause shock, fire, or other hazards.

(4) The leads in the products are routed and dressed with ties, clamps, tubing's, barriers and the like to be separated from live parts, high temperature parts, moving parts and / or sharp edges for the prevention of electric shock and fire hazard. When service is required, the original lead routing and dress should be observed, and it should be confirmed that they have been returned to normal, after re-assembling.

WARNING

(1) The equipment has been designed and manufactured to meet international safety standards.
(2) It is the legal responsibility of the repairer to ensure that these safety standards are maintained.
(3) Repairs must be made in accordance with the relevant safety standards.
(4) It is essential that safety critical components are replaced by approved parts.
(5) If mains voltage selector is provided, check setting for local voltage.

SECTION 2
SPECIFIC SERVICE INSTRUCTIONS

2.1 FEATURES

- It is a remote controlled colour television.
- It can tune cable channels.
- Controlling the TV is very easy by its menu driven system.
- It has Euroconnector sockets for external device (such as video recorder, video games, audio set, etc.)
- Stereo sound systems are available.
- Full function Teletext (Fastext, Toptext, WST).
- AUTO PROGRAM (Automatic Programming System).
- All programs can be named.
- Forward or backward automatic tuning.
- Sleep timer.
- Child Lock.
- Blue Background
- Panoramic mode
- Comb FIlter
- CTI (Colour Transient Improvement)
- T-V Link
- Automatic sound muting when no transmission.
- 5 minutes after the broadcasting (close down), the TV switches itself automatically to stand-by mode.
- WSS (Wide Screen Signaling)

SECTION 3
DISASSEMBLY

3.1 DISASSEMBLY PROCEDURE

3.1.1 REMOVING THE REAR COVER

(1) Unplug the power cord.
(2) Remove the 8 screws **[A]**.
(3) Remove the 4 screws **[B]**.
(4) Withdraw the REAR COVER toward you.

3.1.2 REMOVING THE BACK DOOR

• Remove the REAR COVER.
(1) Remove the 2 screws **[C]**.
(2) Withdraw the BACK DOOR toward you.

3.1.3 REMOVING THE SPEAKER and TWEETER

• Remove the REAR COVER.
(1) Remove the 4 screws **[D]**, and remove the SPEAKER.
(2) Remove the other hand SPEAKER in the same steps.
(3) Remove the 2 screws **[E]**, and remove the TWEETER.
(4) Remove the other hand TWEETER in the same steps.

3.1.4 REMOVING THE MAIN PWB

• Remove the REAR COVER.
• Remove the BACK DOOR.
(1) Remove the 4 screws **[F]**.
(2) Slightly raise the both sides of the MAIN PWB by hand and withdraw the MAIN PWB backward.

[CAUTION]
If necessary, take off the wire clamp, connectors etc.
Be careful enough when developing a MAIN PWB.

3.1.5 REMOVING THE SIDE CONTROL PWB

• Remove the REAR COVER.
(1) Remove the 2 screws **[G]**.
(2) Remove the SIDE CONTROL PWB.

3.1.6 REMOVING THE FRONT AV & HEADPHONE JACK PWB

• Remove the REAR COVER.
(1) Remove the 2 screws **[H]**.
(2) Remove the FRONT AV & HEADPHONE JACK PWB.

3.1.7 REMOVING THE POWER SWITCH PWB

• Remove the REAR COVER.
(1) Remove the 2 screws **[I]**, and remove the POWER SWITCH PWB.

3.1.8 REMOVING THE LED PWB

• Remove the REAR COVER.
(1) Remove the 2 screws **[J]**, and remove the LED PWB.

3.1.9 CHECKING THE PW BOARD

• To check the back side of the PW Board.
(1) Pull out the PW Board. (Refer to REMOVING THE MAIN PWB).
(2) Erect the PW Board vertically so that you can easily check the back side of the PWB.

[CAUTION]
• When erecting the PW Board, be careful so that there will be no contacting with other PW Board.
• Before turning on power, make sure that the wire connector is properly connected.
• When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PWB.

3.1.10 WIRE CLAMPING AND CABLE TYING

(1) Be sure to clamp the wire.
(2) Never remove the cable tie used for tying the wires together.
Should it be inadvertently removed, be sure to tie the wires with a new cable tie.

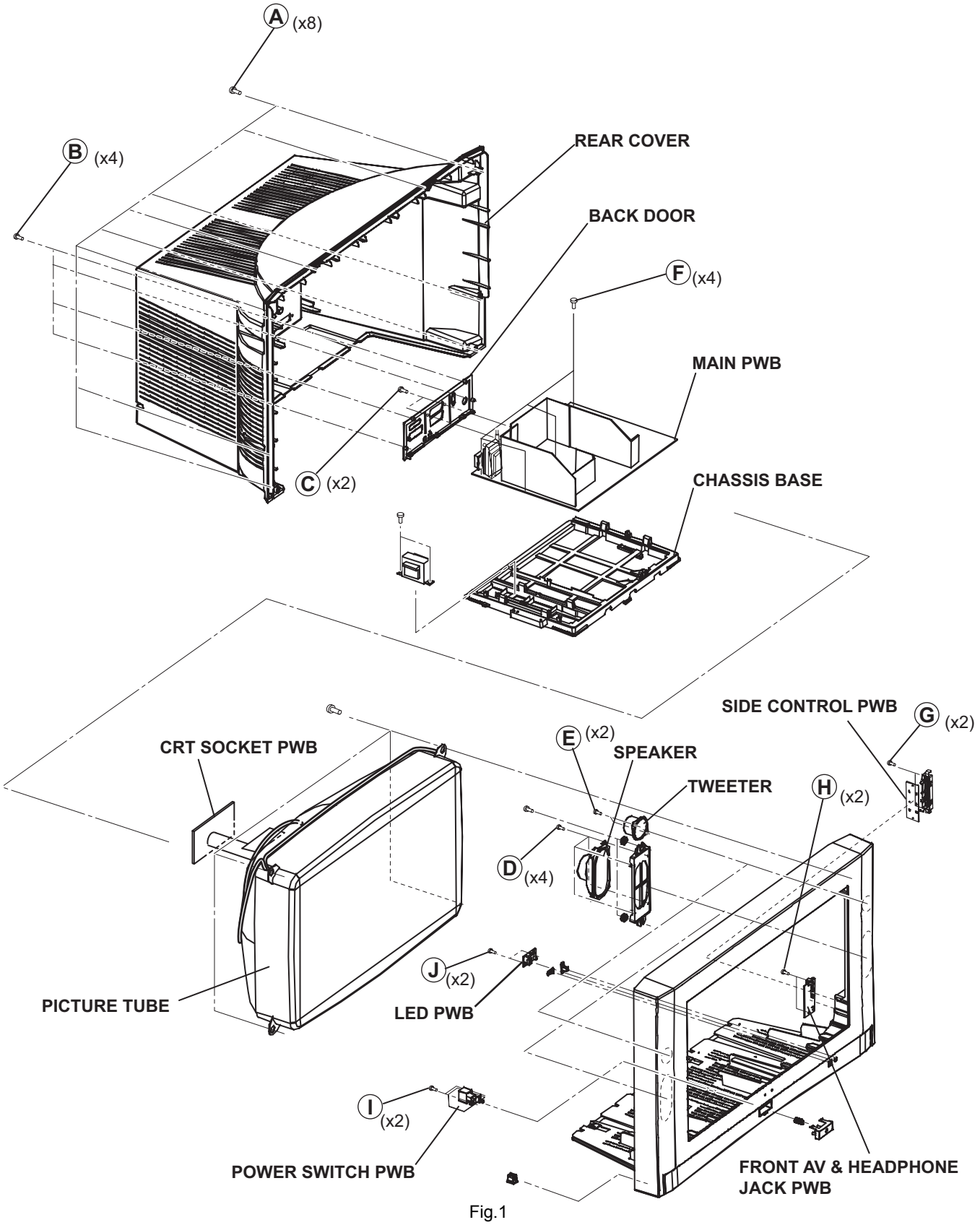

A (x8)
B (x4)
REAR COVER
BACK DOOR
F (x4)
MAIN PWB
C (x2)
CHASSIS BASE
SIDE CONTROL PWB
G (x2)
CRT SOCKET PWB
E (x2)
SPEAKER
TWEETER
H (x2)
D (x4)
J (x2)
PICTURE TUBE
LED PWB
I (x2)
POWER SWITCH PWB
FRONT AV & HEADPHONE JACK PWB

Fig.1

3.2 SETTING OF THE LAST MEMORY FOR SHIPMENT

3.2.1 USER SETTING VALUES

Setting item	Setting value	Setting item	Setting value
PICTURE MENU		INSTALL. MENU	
BRIGHTNESS	These adjust are automatically restored when AUTO PROGRAM bit in Service menu is set. The procedure for setting AUTO PROGRAM bit is described.	PROGRAMME	Refer to instruction book
CONTRAST		BAND	
COLOUR		CHANNEL	
SHARPNESS		STANDARD	
HUE (only NTSC)		COLOUR SYSTEM	
PICTURE MODE	USER	DECODER (EXT-2)	
COLOUR TEMP	NORMAL	FINE TUNING	
ZOOM	AUTO	SEARCH	
		STORE	
SOUND MENU		FEATURE MENU	
BALANCE	Center	SLEEP TIMER	OFF
BASS	Center	CHILD LOCK	OFF
TREBLE	Center	LANGUAGE	ENGLISH
HYPER SOUND	OFF	EXT-2 OUTPUT	TV
		BLUE BACKGROUND	ON

3.2.2 SETTING A.P.S. (AUTO STORE)

(1) Press **[MENU]** key on the remote control unit to display the main menu.
(2) Press [▲]/[▼] keys to select "**PROGRAM**" item, them [◀]/[▶] keys to display the "**PROGRAM**" menu.
(3) Press the **[BLUE]** key to enter the **AUTOSTORE** mode.
(4) Press [▲]/[▼] keys to choose the "**COUNTRY**", then press [◀]/[▶] keys the choose country you are nou located.
(5) Press [▲]/[▼] keys to choose the "**CONTINUE**", then press [▶] key to start AUTO PROGRAM. The message screen appears.

NOTE :
To cancel the AUTO PROGRAM, press the **[PICTURE]** key on the remote control unit.

(6) After AUTO PROGRAM is finalized, the **PROGRAM** menu appears again.
(7) Press the **[PICTURE]** key on the remote control unit to exit main menu.

3.3 REPLACEMENT OF CHIP COMPONENT

3.3.1 CAUTIONS

(1) Avoid heating for more than 3 seconds.
(2) Do not rub the electrodes and the resist parts of the pattern.
(3) When removing a chip part, melt the solder adequately.
(4) Do not reuse a chip part after removing it.

3.3.2 SOLDERING IRON

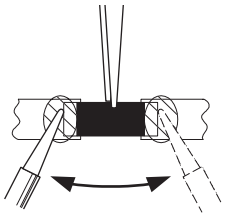
(1) Use a high insulation soldering iron with a thin pointed end of it.
(2) A 30w soldering iron is recommended for easily removing parts.

3.3.3 REPLACEMENT STEPS

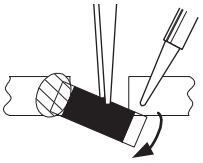
1. How to remove Chip parts

[Resistors, capacitors, etc.]

(1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.



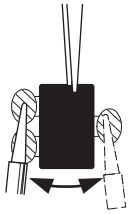
(2) Shift with the tweezers and remove the chip part.



[Transistors, diodes, variable resistors, etc.]

(1) Apply extra solder to each lead.

(2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



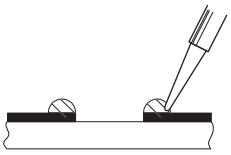
NOTE :

After removing the part, remove remaining solder from the pattern.

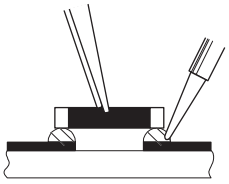
2. How to install Chip parts

[Resistors, capacitors, etc.]

(1) Apply solder to the pattern as indicated in the figure.

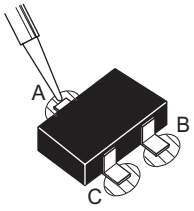


(2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

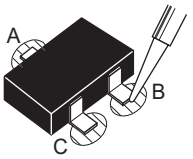


[Transistors, diodes, variable resistors, etc.]

(1) Apply solder to the pattern as indicated in the figure.
(2) Grasp the chip part with tweezers and place it on the solder.
(3) First solder lead **A** as indicated in the figure.



(4) Then solder leads **B** and **C**.



SECTION 4
ADJUSTMENT

4.1 ADJUSTMENT PREPARATION

(1) You can make the necessary adjustments for this unit with either the Remote Control Unit or with the adjustment tools and parts as given below.
(2) Adjustment with the Remote Control Unit is made on the basis of the initial setting values, however, the new setting values which set the screen to its optimum condition may differ from the initial settings.
(3) Make sure that AC power is turned on correctly.
(4) Turn on the power for set and test equipment before use, and start the adjustment procedures after waiting at least 30 minutes.
(5) Unless otherwise specified, prepare the most suitable reception or input signal for adjustment.
(6) Never touch any adjustment parts which are not specified in the list for this adjustment - variable resistors, transformers, condensers, etc.
(7) Presetting before adjustment.
Unless otherwise specified in the adjustment instructions, preset the following functions with the remote control unit:

Setting item	Setting value
BRIGHTNESS	Center
CONTRAST	
COLOUR	
SHARPNESS	
COLOUR TEMP	NORMAL
ZOOM	AUTO

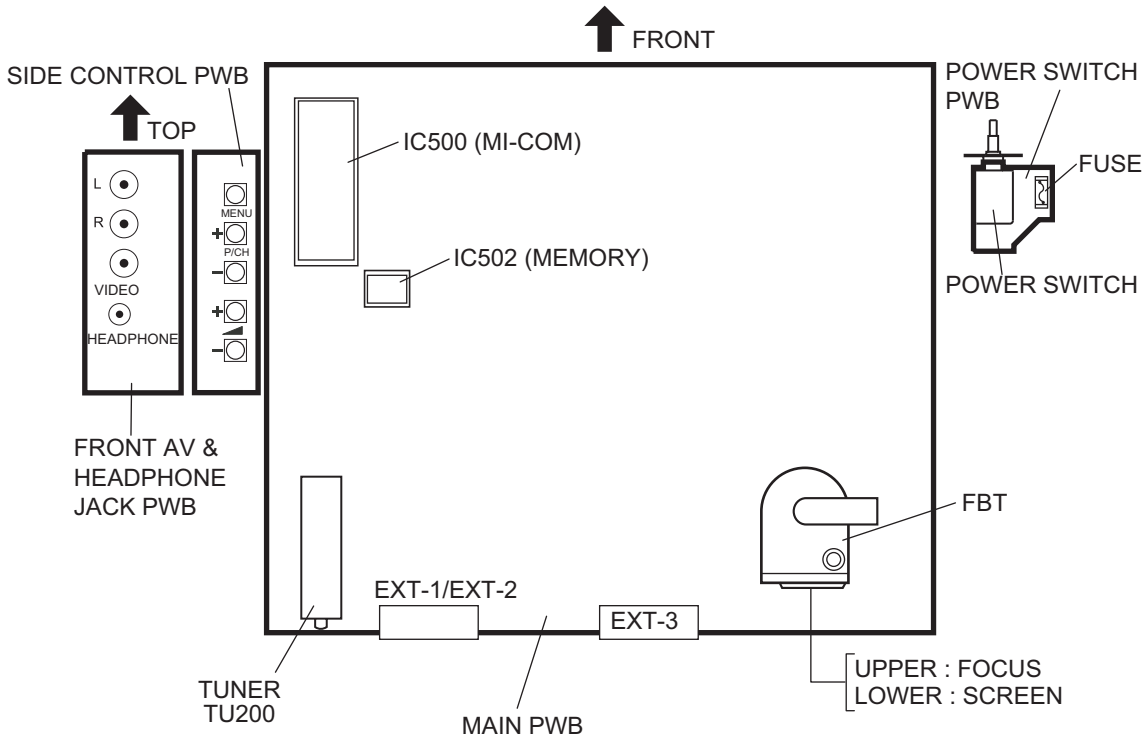
4.2 MEASURING EQUIPMENT

(1) DC voltmeter (or digital voltmeter)
(2) Signal generator (Pattern generator)
: [PAL / SECAM / NTSC]
(3) Remote control unit

4.3 ADJUSTMENT ITEM

- FOCUS ADJUSTMENT
- SCREEN ADJUSTMENT
- AGC ADJUSTMENT
- DEFLECTION CIRCUIT ADJUSTMENT
- VIDEO CIRCUIT ADJUSTMENT

4.4 ADJUSTMENT LOCATIONS



4.5 BASIC OPERATION OF SERVICE MODE

4.5.1 HOW TO ENTER THE SERVICE MODE

(1) Press the [**INFORMATION**] key and [**MUTING**] key simultaneously in the main menu, and the SERVICE MENU screen (Fig.1) will be displayed.

SERVICE MENU

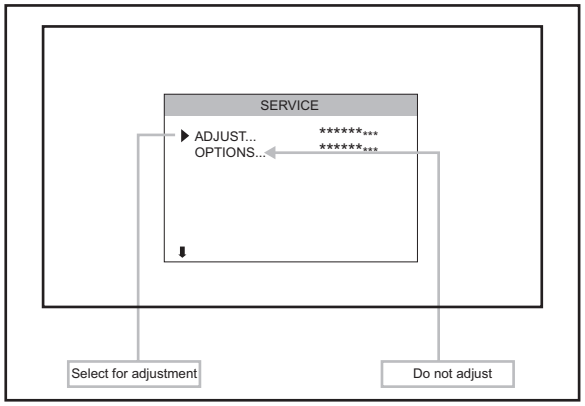


Fig.1

(2) While the SERVICE MENU screen is displayed, press the [▲]/[▼] and [◀]/[▶] key and select the "**ADJUST...**", then ADJUST MENU screen (Fig.2) will be displayed.

ADJUST MENU

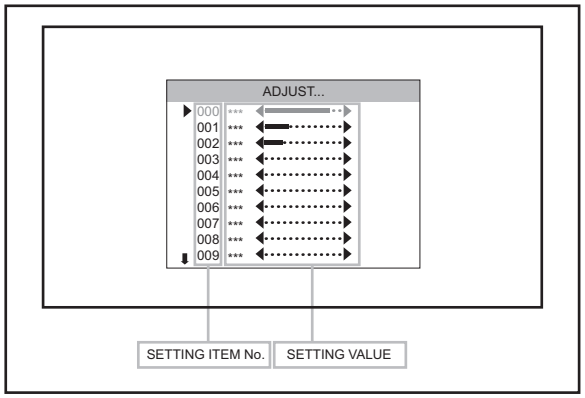


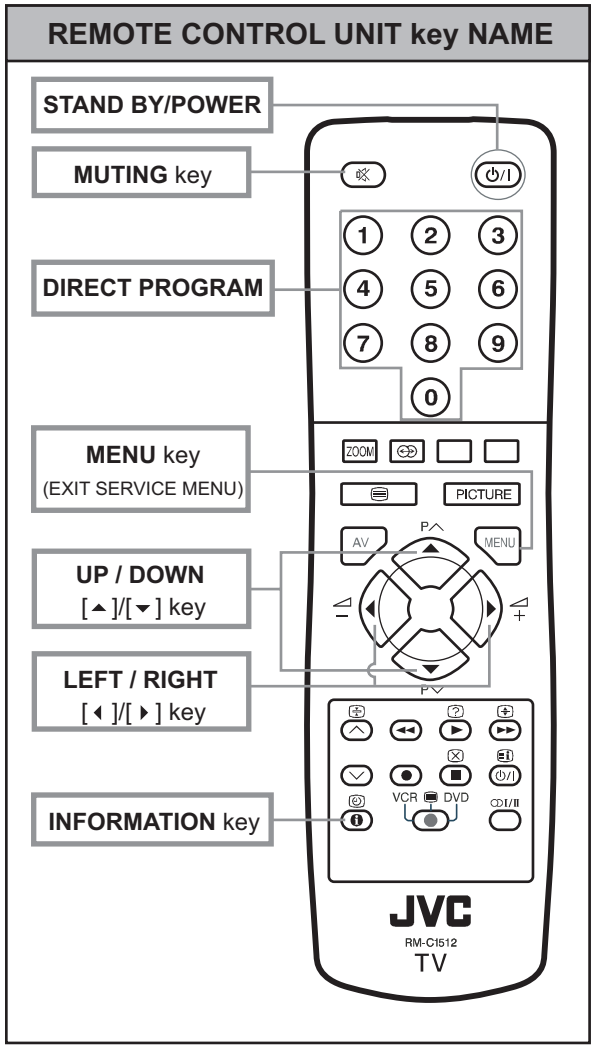
Fig.2

4.5.2 SELECTION OF ADJUSTMENT ITEMS

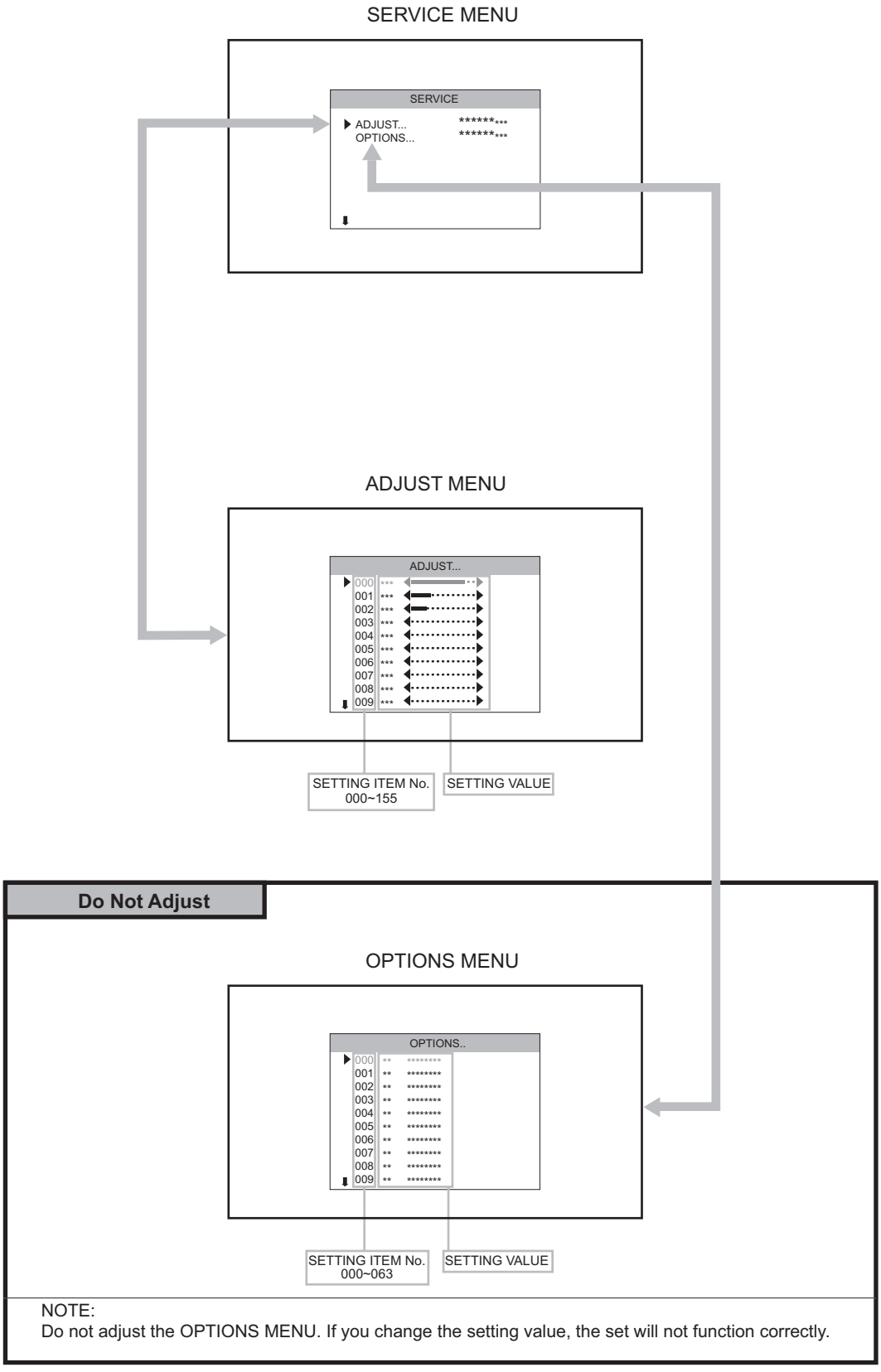
(1) Enter the SERVICE MODE.
(2) Press the FUNCTION [▲]/[▼] key to select the adjustment item.
(3) Press the FUNCTION [◀]/[▶] key to set the setting value.
(4) The setting value will be stored auto matically when release the REMOTE CONTROL UNIT keys.

4.5.3 HOW TO EXIT SERVICE MODE

(1) Press the [**MENU**] key.

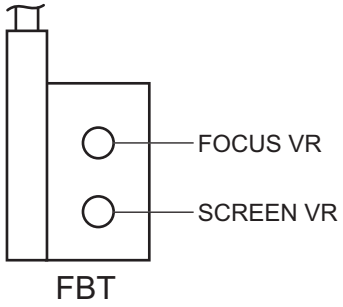


4.5.4 SERVICE MENU SCREEN

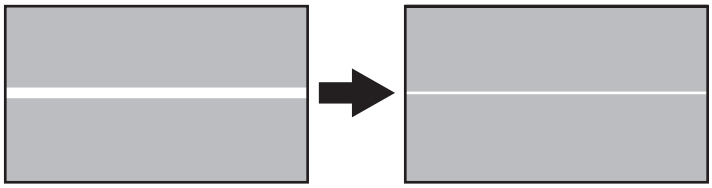


4.6 ADJUSTMENTS PROCEDURE

4.6.1 FOCUS ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
FOCUS adjustment	Signal generator Remote control unit		**FOCUS VR** [On the FBT]	(1) Receive a PAL crosshatch signal. (2) Adjust **FOCUS VR** on the FBT as thin as possible. 

4.6.2 SCREEN ADJUSTMENT

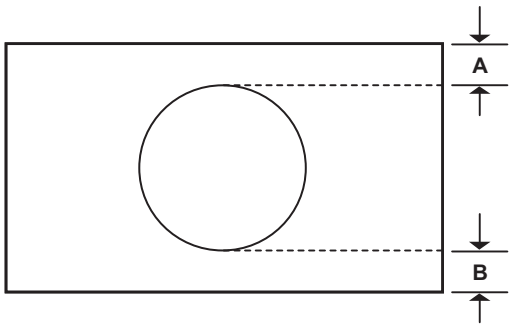
Item	Measuring instrument	Test point	Adjustment part	Description
SCREEN adjustment	Remote control unit		**002** **SCREEN VR** **[On the FBT]**	(1) Enter the OPTIONS MENU. (2) Select option No.**002** and change bit 6 from **0 to 1** disabling vertical scan. Then horizontal line appears. (3) Adjust horizontal line as thin as possible via screen adjust pot. (4) Press number 0 key to leave service menu.
				

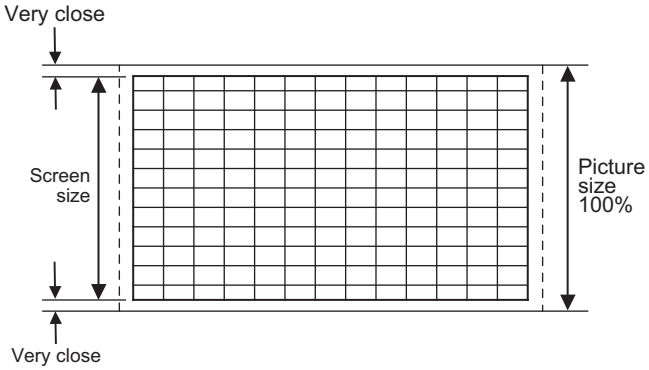
4.6.3 AGC ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
AGC adjustment	Signal generator Remote control unit DC volt meter		**003**	(1) Receive a PAL signal at 60dBμV RF signal level. (2) Enter the SERVICE MENU. (3) Select ADJUST MENU. (4) Select **003**. (5) Adjust **003** by pressing until voltage at **pin 1** of TUNER is equal to 3.0V.

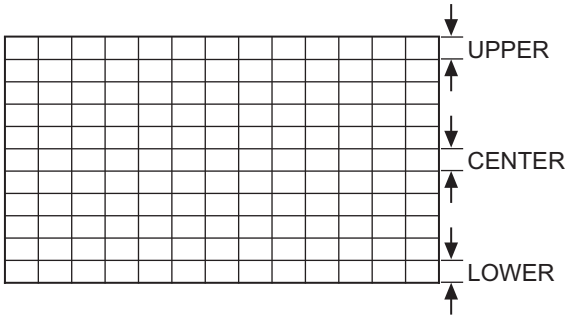
4.6.4 DEFLECTION CIRCUIT ADJUSTMENT

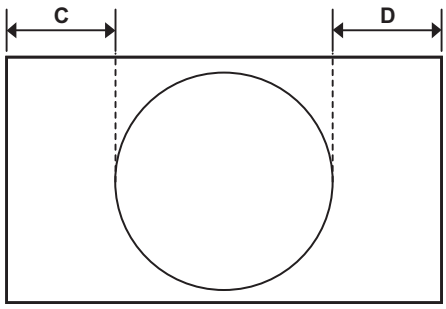
<table>
<tr><th>Item</th><th>Measuring instrument</th><th>Test point</th><th>Adjustment part</th><th>Description</th></tr>
<tr><td>VERTICAL POSITION adjustment</td><td>Signal generator

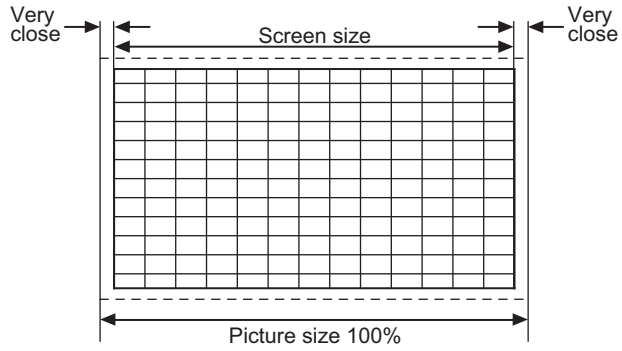
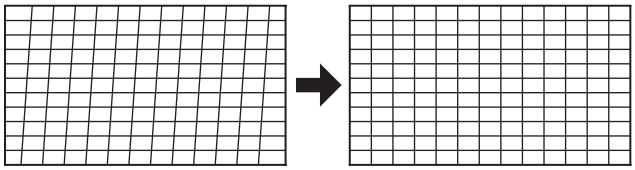
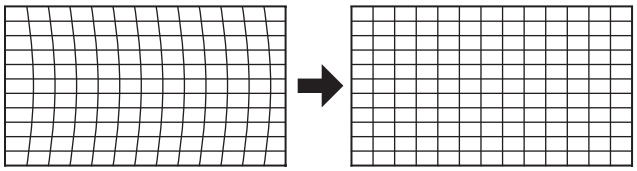
Remote control unit</td><td></td><td>030 (REGULAR)
040 (PANORAMIC)
050 (14:9 ZOOM)
060 (16:9 ZOOM)
070 (16:9 ZOOM SUBTITLE)
110 (FULL)</td><td rowspan="2">(1) Receive a PAL circle pattern signal.
(2) Enter the SERVICE MODE.
(3) Select ADJUST MENU.
(4) Select 030.
(5) Adjust 030 to make A=B.
(6) Check and readjust 030 item if the adjustment becomes improper after some other geometric adjustments are done.
(7) Select 040 (PANORAMIC).
(8) Adjust 040 in the same procedure.
(9) Select 050 (14:9 ZOOM).
(10) Adjust 050 in the same procedure.
(11) Select 060 (16:9 ZOOM).
(12) Adjust 060 in the same procedure.
(13) Select 070 (16:9 ZOOM SUBTITLE).
(14) Adjust 070 in the same procedure.
(15) Select 110 (FULL).
(16) Adjust 110 in the same procedure.</td></tr>
<tr><td colspan="4"> 
</td></tr>
<tr><td>VERTICAL SIZE adjustment</td><td>Signal generator

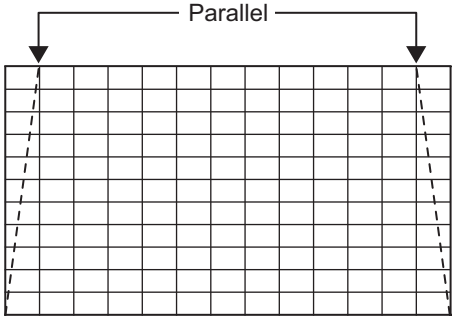
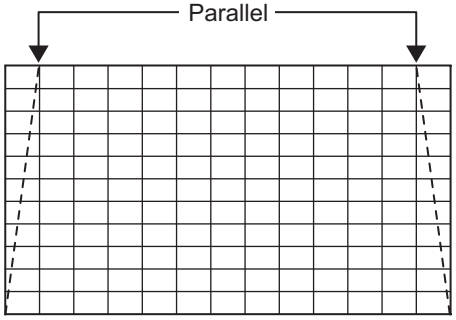
Remote control unit</td><td></td><td>031 (REGULAR)
041 (PANORAMIC)
051 (14:9 ZOOM)
061 (16:9 ZOOM)
071 (16:9 ZOOM SUBTITLE)
111 (FULL)</td><td rowspan="2">(1) Receive a PAL crosshatch signal.
(2) Enter the SERVICE MODE.
(3) Select ADJUST MENU.
(4) Select 031 (REGULAR).
(5) Adjust 031 until horizontal black lines on both the upper and lower part of the crosshatch pattern become very closeted the upper and lower horizontal sides of picture size and nearly about to disappear.
(6) Check and readjust 031 item if the adjustment becomes improper after some other geometric adjustments are done.
(7) Select 041 (PANORAMIC).
(8) Adjust 041 in the same procedure.
(9) Select 051 (14:9 ZOOM).
(10) Adjust 051 in the same procedure.
(11) Select 061 (16:9 ZOOM).
(12) Adjust 061 in the same procedure.
(13) Select 071 (16:9 ZOOM SUBTITLE).
(14) Adjust 071 in the same procedure.
(15) Select 111 (FULL).
(16) Adjust 111 in the same procedure.</td></tr>
<tr><td colspan="4"> 
</td></tr>
</table>

Item	Measuring instrument	Test point	Adjustment part	Description
VERTICAL S-CORRECTION & LINEARITY adjustment	Signal generator Remote control unit		**032** (REGULAR) **033** (REGULAR) **042** (PANORAMIC) **043** (PANORAMIC) **052** (14:9 ZOOM) **053** (14:9 ZOOM) **062** (16:9 ZOOM) **063** (16:9 ZOOM) **072** (16:9 ZOOM SUBTITLE) **073** (16:9 ZOOM SUBTITLE) **112** (FULL) **113** (FULL)	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **032** (REGULAR). (5) Adjust **032** until the size of squares on both the upper and lower part of the crosshatch pattern become equal to the squares laying on the vertical center of the crosshatch pattern. (6) Check and readjust **032** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **033** (REGULAR). (8) Adjust **033** until all the size of squares of the crosshatch pattern become in equal size from the top of the screen to its bottom of the whole screen. (9) Check and readjust **033** item if the adjustment becomes improper after some other geometric adjustments (especially after than S-COR adjustment) are done. (10) Select **042** (PANORAMIC). (11) Adjust **042** in the same procedure as (5). (12) Select **043** (PANORAMIC). (13) Adjust **043** in the same procedure as (8). (14) Select **052** (14:9 ZOOM). (15) Adjust **052** in the same procedure as (5). (16) Select **053** (14:9 ZOOM). (17) Adjust **053** in the same procedure as (8). (18) Select **062** (16:9 ZOOM). (19) Adjust **062** in the same procedure as (5). (20) Select **063** (16:9 ZOOM). (21) Adjust **063** in the same procedure as (8). (22) Select **072** (16:9 ZOOM SUBTITLE). (23) Adjust **072** in the same procedure as (5). (24) Select **073** (16:9 ZOOM SUBTITLE). (25) Adjust **073** in the same procedure as (8). (26) Select **112** (FULL). (27) Adjust **112** in the same procedure as (5). (28) Select **113** (FULL). (29) Adjust **113** in the same procedure as (8).
HORIZONTAL POSITION adjustment	Signal generator Remote control unit		**038** (REGULAR) **048** (PANORAMIC) **058** (14:9 ZOOM) **068** (16:9 ZOOM) **078** (16:9 ZOOM SUBTITLE) **118** (FULL)	(1) Receive a PAL circle pattern signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **038** (REGULAR). (5) Adjust **038** to make **C=D**. (6) Check and readjust **038** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **048** (PANORAMIC). (8) Adjust **048** in the same procedure. (9) Select **058** (14:9 ZOOM). (10) Adjust **058** in the same procedure. (11) Select **068** (16:9 ZOOM). (12) Adjust **068** in the same procedure. (13) Select **078** (16:9 ZOOM SUBTITLE). (14) Adjust **078** in the same procedure. (15) Select **118** (FULL). (16) Adjust **118** in the same procedure.

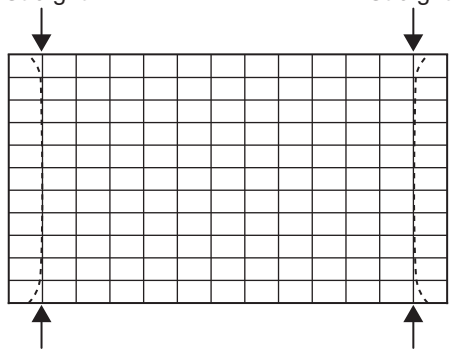


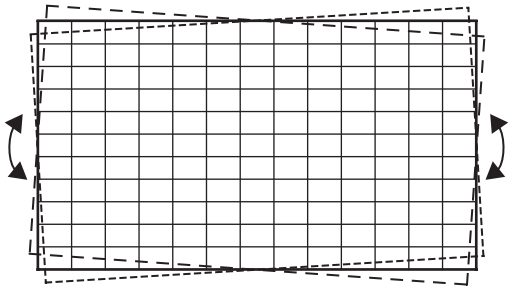


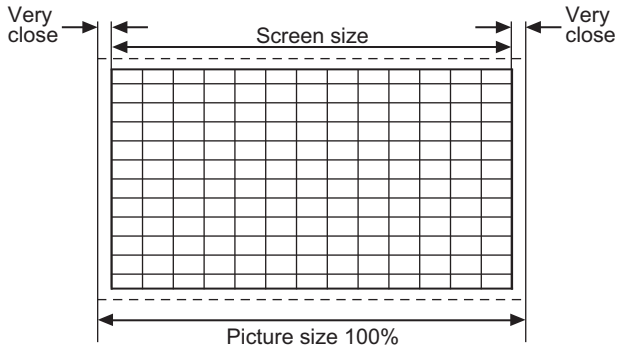
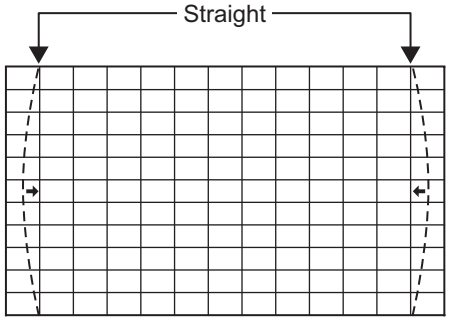
Item	Measuring instrument	Test point	Adjustment part	Description
HORIZONTAL SIZE adjustment	Signal generator Remote control unit		**039** (REGULAR) **049** (PANORAMIC) **059** (14:9 ZOOM) **069** (16:9 ZOOM) **079** (16:9 ZOOM SUBTITLE) **119** (FULL)	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **039** (REGULAR). (5) Adjust **039** until vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust **039** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **049** (PANORAMIC). (8) Adjust **049** in the same procedure. (9) Select **059** (14:9 ZOOM). (10) Adjust **059** in the same procedure. (11) Select **069** (16:9 ZOOM). (12) Adjust **069** in the same procedure. (13) Select **079** (16:9 ZOOM SUBTITLE). (14) Adjust **079** in the same procedure. (15) Select **119** (FULL). (16) Adjust **119** in the same procedure.
				
ANGLE adjustment	Signal generator Remote control unit		**016**	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **016**. (5) Adjust **016** until the vertical lines of the crosshatch pattern become straight. (6) Check and readjust **016** item if the adjustment becomes improper after some other geometric adjustments are done.
				
BOW adjustment	Signal generator Remote control unit		**017**	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **017**. (5) Adjust **017** until the vertical lines become straight. (6) Check and readjust **017** item if the adjustment becomes improper after some other geometric adjustments are done. **NOTE:** In case where there is a bow-shaped distortion of images on the screen. (Figure)
				

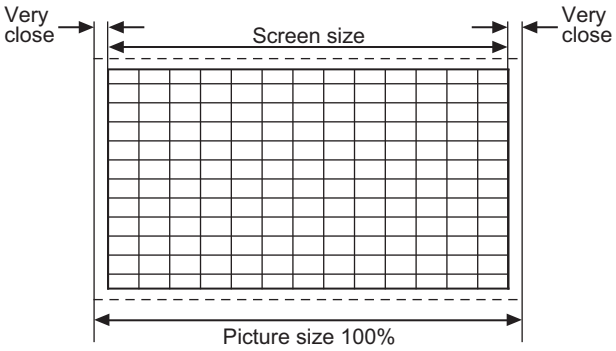
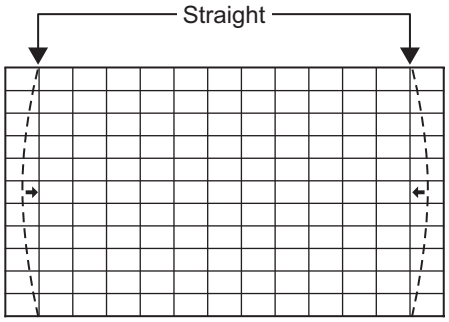
Item	Measuring instrument	Test point	Adjustment part	Description
TRAPEZIUM adjustment	Signal generator Remote control unit		**034** (REGULAR) **044** (PANORAMIC) **054** (14:9 ZOOM) **064** (16:9 ZOOM) **074** (16:9 ZOOM SUBTITLE) **114** (FULL)	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **034** (REGULAR). (5) Adjust **034** until vertical lines, especially lines at the sides of the picture frame become parallel to the both sides of picture tubes as close as possible. (6) Check and readjust **034** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **044** (PANORAMIC). (8) Adjust **044** in the same procedure. (9) Select **054** (14:9 ZOOM). (10) Adjust **054** in the same procedure. (11) Select **064** (16:9 ZOOM). (12) Adjust **064** in the same procedure. (13) Select **074** (16:9 ZOOM SUBTITLE). (14) Adjust **074** in the same procedure. (15) Select **114** (FULL). (16) Adjust **114** in the same procedure.
				
SIDE PIN adjustment	Signal generator Remote control unit		**035** (REGULAR) **045** (PANORAMIC) **055** (14:9 ZOOM) **065** (16:9 ZOOM) **075** (16:9 ZOOM SUBTITLE) **115** (FULL)	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **035** (REGULAR). (5) Adjust **035** until vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen. (6) Check and readjust **035** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **045** (PANORAMIC). (8) Adjust **045** in the same procedure. (9) Select **055** (14:9 ZOOM). (10) Adjust **055** in the same procedure. (11) Select **065** (16:9 ZOOM). (12) Adjust **065** in the same procedure. (13) Select **075** (16:9 ZOOM SUBTITLE). (14) Adjust **075** in the same procedure. (15) Select **115** (FULL). (16) Adjust **115** in the same procedure.
				

<table>
<tr><th>Item</th><th>Measuring instrument</th><th>Test point</th><th>Adjustment part</th><th>Description</th></tr>
<tr><td>CORNER adjustment</td><td>Signal generator

Remote control unit</td><td></td><td>036 (REGULAR)
037 (REGULAR)
046 (PANORAMIC)
047 (PANORAMIC)
056 (14:9 ZOOM)
057 (14:9 ZOOM)
066 (16:9 ZOOM)
067 (16:9 ZOOM)
076 (16:9 ZOOM SUBTITLE)
077 (16:9 ZOOM SUBTITLE)
116 (FULL)
117 (FULL)</td><td rowspan="2">(1) Receive a PAL crosshatch signal.
(2) Enter the SERVICE MODE.
(3) Select ADJUST MENU.
(4) Select 036 (REGULAR).
(5) Adjust 036 until vertical lines at the upper corners of the picture frame become vertical and parallel to vertical corner sides of picture tube.
(6) Check and readjust 036 item if the adjustment becomes improper after some other geometric adjustments are done.
(7) Select 037 (REGULAR).
(8) Adjust 037 until vertical lines at the lower corners of the picture frame become vertical and parallel to vertical corner sides of picture tube.
(9) Check and readjust 037 item if the adjustment becomes improper after some other geometric adjustments are done.
(10) Select 116 (FULL).
(11) Adjust 116 in the same procedure as (5).
(12) Select 117 (FULL).
(13) Adjust 117 in the same procedure as (8).</td></tr>
<tr><td colspan="4">Straight Straight
  </td></tr>
<tr><td>ROTATION adjustment</td><td>Signal generator

Remote control unit</td><td></td><td>083</td><td rowspan="2">(1) Receive a PAL crosshatch signal.
(2) Enter the SERVICE MODE.
(3) Select ADJUST MENU.
(4) Select 083.
(5) Adjust 083 to rotate the complete master clockwise and counter clockwise depending on the CRT.
(6) Check and readjust 083 item if the adjustment becomes improper after some other geometric adjustments are done.</td></tr>
<tr><td colspan="4">  </td></tr>
</table>

Item	Measuring instrument	Test point	Adjustment part	Description
NTSC HORIZONTAL SIZE adjustment	Signal generator Remote control unit		**135** (REGULAR) **142** (FULL)	(1) Receive a NTSC crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **135** (REGULAR). (5) Adjust **135** until vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust **TRAPEZ** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **142** (FULL). (8) Adjust **142** in the same procedure.
				
NTSC SIDE PIN adjustment	Signal generator Remote control unit		**136** (REGULAR)	(1) Receive a NTSC crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **136** (REGULAR). (5) Adjust **136** until vertical lines close to the both sides of the picture frame become straight to vertical sides of picture tube without any bending to left or to right side of the screen. (6) Check and readjust **136** item if the adjustment becomes improper after some other geometric adjustments are done.
				
TELETEXT SCREEN SIZE adjustment	Signal generator Remote control unit		**143**	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **143**. (5) Adjust **143** to adjust the proper vertical size of Teletext screen. (6) Check and readjust **143** item if the adjustment becomes improper after some other geometric adjustments are done.

Item	Measuring instrument	Test point	Adjustment part	Description
NTSC HORIZONTAL SIZE adjustment	Signal generator Remote control unit		**135** **142** (16:9 mode)	(1) Receive a NTSC crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **135**. (5) Adjust **135** until vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust **TRAPEZ** item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select **142** (16:9 mode). (8) Adjust **142** in the same procedure.
				
NTSC SIDE PIN adjustment	Signal generator Remote control unit		**136**	(1) Receive a NTSC crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **136**. (5) Adjust **136** until vertical lines close to the both sides of the picture frame become straight to vertical sides of picture tube without any bending to left or to right side of the screen. (6) Check and readjust **136** item if the adjustment becomes improper after some other geometric adjustments are done.
				
TELETEXT SCREEN SIZE adjustment	Signal generator Remote control unit		**143**	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **143**. (5) Adjust **143** to adjust the proper vertical size of Teletext screen. (6) Check and readjust **143** item if the adjustment becomes improper after some other geometric adjustments are done.

4.6.5 VIDEO CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description
WHITE BALANCE adjustment	Signal generator Remote control unit		**023** **024** **025**	(1) Receive a PAL black & white signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **023**, **024** and **025** respectively. (5) Adjust **023**, **024** and **025** respectively, until the white part turns to pure white without any other colour.
COLOUR CUTOFF LEVEL adjustment	Signal generator Remote control unit		**026** **027** **028**	(1) Receive a PAL crosshatch signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **026**, **027** and **028** respectively. (5) Adjust **026**, **027** and **028** respectively, until the black part turns to pure black without any other colour.
PAL Y DELAY adjustment	Signal generator Remote control unit		**006**	(1) Receive a **PAL** colour bar signal. (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **006**. (5) Adjust **006** until the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other.
NTSC Y DELAY adjustment	Signal generator Remote control unit		**008**	(1) Receive a **NTSC** colour bar signal from an external source (e.g. FRONT AV : EXT-4). (2) Enter the SERVICE MODE. (3) Select ADJUST MENU. (4) Select **008**. (5) Adjust **008** by pressing until the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other.

SECTION 5
TROUBLESHOOTING

This service manual does not describe TROUBLESHOOTING.

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